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lar section made by the intersection of D, E and perpendicular to the line joining their centres in the plane KL draw the line ST intersecting the line SII' at S . Draw SR, ST . Then the proof is the same as that for problem 18.

Also solved by Professor H. C. WHITAKER.

29. Proposed by H. W. HOLYCROSS, Superintendent of Schools, Pottersburg, Ohio.

If the two angles at base of a triangle are bisected; and through the point of meeting of the bisectors a line is drawn parallel to the base, the length of the parallel between the sides is equal to the sum of the segments of the sides between the parallel and the base.

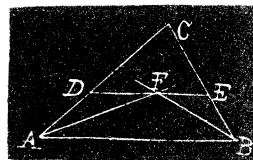
Solution by I. L. BEVERAGE, Monterey, Virginia; I. W. TAYLOR, Berea, Ohio; and the PROPOSER.

Let ABC be any triangle, AF and BF the bisectors of the angles A and B , respectively. Through F draw DE parallel to AB . Then $\angle DFE = \angle FAB$, being alternate interior angles of parallel lines. But $\angle DAF = \angle FAB$, AF being the bisector of $\angle DAB$.

$\therefore \angle DAF = \angle DFE$. $\therefore$ The triangle ADF is isosceles and side $AD =$ side DF . In like manner it may be shown that $FE = EB$.

$\therefore DF + FE$, or $DE = AD + BE$. Q. E. D.

This problem was solved in slightly different ways by J. W. Watson, G. B. M. Zerr, Cooper D. Schmitt, M. A. Gruber, J. K. Ellwood, R. H. Young, P. S. Berg, John Faught, J. C. Corbin, P. C. Cullen, J. F. W. Scheffer and H. C. Whitaker.



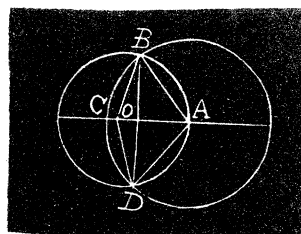
30. Proposed by CHARLES E. MYERS, Canton, Ohio.

A circle containing one acre is cut by another whose center is on the circumference of the given circle, and the area common to both is one-half acre. Find the radius of the cutting circle.

Solution by J. W. WATSON, Middle Creek, Ohio; W. L. HARVEY, Portland, Maine; J. T. FAIRCHILD, Ada, Ohio; P. S. BERG, Apple Creek, Ohio; and JOHN DOLMAN, Jr., Philadelphia, Pennsylvania

Let O be the center of the circle. A the point on the circumference which is the center of the cutting circle, and R its radius.

With A as a center and radius R draw the arc BCD cutting the circumference at B and D . Join AO and produce it to C . Join CB , OB and AB . Put $r = \sqrt{\frac{10}{\pi}} = 7.136$ rods, radius of the first circle. Put $\angle BAO = \angle OBA = \theta$. Then $\angle BOA = \pi - 2\theta$, $\angle BCA = \angle CBA = \frac{1}{2}(\pi - \theta)$.



$$\text{Sector } BOA = \frac{\pi r^2 (\pi - 2\theta)}{2\pi}, \text{ sector } BAC = \frac{\pi R^2 \theta}{2\pi}, \triangle BAO = \frac{1}{2} R r \sin \theta.$$

$$\text{Then we have } \frac{\pi r^2 (\pi - 2\theta)}{2\pi} + \frac{\pi R^2 \theta}{2\pi} - \frac{1}{2} R r \sin \theta = \frac{\pi r^2}{4} \dots \text{ But } R = 2r \cos \theta.$$